Measurement of the Np-237 Neutron Capture Cross Section from Thermal to 100 eV

Oleg A. Shcherbakov[1], Hideo Harada[1], Kazuyoshi Furutaka[1], Shoji Nakamura[1], Hitoshi Sakane[1], Katsuhei Kobayashi[2], Shuji Yamamoto[2], Jun-ichi Hori[2]

[1] *Japan Nuclear Cycle Development Institute*
[2] *Kyoto University Research Reactor Institute*

For a study of the incineration of nuclear waste, the transmutation of Np-237 has a first priority due to its amount and activity in a burn-up fuel. The existing limited experimental data on capture cross section of Np-237 in resolved resonance range below $\sim$ 200 eV have been obtained using small efficiency g-ray detectors with or without pulse-weighting technique. Therefore there is obvious necessity in new measurements of neutron capture cross section of Np-237 utilizing another detection technique to improve experimental database for this nucleus.

The present time-of-flight measurements were carried out using the 46 MeV electron Linac of KURRI as a pulsed neutron source and the large 8.54 liter 16-section BGO scintillation detector of JNC as a total energy detector of prompt capture γ-rays. A newly developed data taking system based on a 40 MHz FLASH ADC enabled to perform the measurements with a highly radioactive 1.1 g sample of Np-237. The capture cross section of Np-237 was measured relative to standard neutron absorption cross section of B-10. Absolute normalization of the capture cross section was carried out using a thermal value obtained from the analysis of Np-237 total cross section measured with the same sample below 1 eV.

The results of neutron capture cross section measurements in the energy range from thermal to 100 eV and total cross section measurements from thermal to 1 eV are presented.

Email: harada@tokai.jnc.go.jp